8-2020

Surface Levels

Keisha Brathwaite
Stephen F Austin State University, kcbrathwaite@gmail.com

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SURFACE LEVELS

By

KEISHA CHRYSTAL BRATHWAITE, Bachelor of Science in Multimedia Design,

Master of Arts in Media Arts and Computer Science,

Master of Software Driven Systems Design

Presented to the Faculty of the Graduate School of

Stephen F. Austin State University

In Partial Fulfillment

Of the Requirements

For the Degree of

Master of Fine Arts

STEPHEN F. AUSTIN STATE UNIVERSITY

August 2020

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APPROVED:

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Mr. Daniel Anguiano, Thesis Director

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Dr. David Lewis, Committee Member

_____

Ms. Candace Hicks, Committee Member

_____

Dr. Josephine Taylor, Committee Member

_____

Pauline M. Sampson, Ph.D.
Dean of Research and Graduate Studies

ACKNOWLEGDEMENTS

The successful execution of this body of work could not have been possible with the extensive guidance and support of my thesis committee.

To my thesis director, Mr. Daniel Anguiano, I express sincere gratitude for contributing your time, direction, and expertise as a designer and educator. I also thank you for ensuring that I had all necessary tools to aid in the completion of this project. To my committee members, Dr. David Lewis and Ms. Candace Hicks, special thanks is extended to you for the immense guidance and wealth of artistic knowledge imparted to me. And to my final committee member, Dr. Josephine Taylor, both your proficiency and assistance, in ensuring that I was properly trained to use all the necessary equipment to complete my research, were greatly appreciated.

I would also like to thank Dr. Melinda Faulkner of the Geology Department, Stephen F. Austin State University, for providing the samples that I used for my research. To Dr. Jeremy Young and others at University College London, under the Nannotax project, for collaborating and allowing me to use their databased imagery for my research and artwork, I extend my gratitude.

In addition, I would like to express heartfelt thanks to my supporters Dr. Mark Barringer, Ms. Cindy Lay, Christine Jolly, Derece Vanterpool, Alicia Belmar, and cohort, Rebecca Schneller, who have been with me throughout this journey.

Finally, to my mother, Ms. Helen Brathwaite, and the rest of my family, who have, and continue to be a constant pillar of strength and support throughout all my educational endeavors, I dedicate the Surface Levels exhibit to you.

ABSTRACT

Surface Levels are depictions of unobserved and imperceptible realities of many phytoplankton exteriors. The exhibition explores various structures, textures, and repetitious forms from microscopic surfaces of objects that cannot be seen with unaided eyes. Electron microscopy is used to perceive and analyze these otherwise unseeable surfaces in depth. Magnifications provide a reference in creating three- and two-dimensional works that are minimalistic and abstract at a visible level. This abstract 3D/2D image collection is translated into material expressions using acrylic sheets, acrylic ink, and wood as the main media for construction of individual works. Collectively, they serve to make the invisible visible.

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INTRODUCTION

Growing up, I've always had a love for the arts, science, and technology. Though I pursued both fields in junior college, I ultimately decided to continue the artistic track. I found ways to connect my passion for both science and technology to and throughout my work, even using science as a primary tool to guide in the artistic expressions of my most recent pieces.

Nature, another driving force, and the main aspect explored, ties together all the inspirations in my art. Nature provides the most basic forms and complex structures. These interesting forms and structures have displayed repetitive elements, movement, rhythm, balance, and unity that I have echoed within my work.

As a native of the Caribbean, I lived most of the first half of my life surrounded by the ocean. To this day, the ocean continues to exist as a part of my core, and in some way, it seems to drift back into my life and my work when I least expect it. Initially, I started my research exploring manmade structures then moved to natural forms of plant and animal life. Then I discovered imagery of nannofossils that drew my interest because of their shapes and forms. In my

research, I found that these nannofossils are produced by one-cell organisms, called phytoplankton(algae), found in the ocean's upper layers. “[These] polyphyletic groups of microscopic photosynthetic protists and cyanobacteria…oxygenate the atmosphere [and]… account for approximately half of Earth’s primary productivity” (Litchman et al. 616). I never knew the ocean I had once observed daily, contained such beautiful and powerful organisms, all of which intensified my eagerness to learn about them.

Surface Levels explores one-cell organisms and investigates their structures, forms, patterns, and repeating qualities they create and leave behind as exoskeletons. The exhibit serves as a way to excavate these entities for a prolonged examination conveyed through layered media in various stylistic representations. Finally, color, which is a mysterious quality to these organisms, is another theme explored by utilizing various color theories and schemes to create a collection that removes its microscopic realities for a more aesthetically pleasing presentation. Together with all the other themes, it will serve as the basis for the abstraction and minimalism in the body of work that makes up the *Surface Levels* exhibit.

WORKING METHOD

Research and Image Collecting

I began my working process exploring objects' surfaces and using copyright-free online images as references to create my artwork. As I continued to explore, I gradually found more interest in scanning electron microscopy imagery because of the high-resolution and detailed views of surfaces that regular photos simply do not provide. The “Scanning Electron Microscope (SEM) [is a] type of electron microscope designed for directly studying the surfaces of solid objects, that utilizes a beam of focused electrons of relatively low energy as an electron probe that is scanned in a regular manner over a specimen” (Ford et al.). The SEM produces detailed images of vast magnifications of objects’ surfaces. The use of such machines requires specialized training and takes some effort in collecting the imagery. Therefore, it was a challenge to obtain any SEM images that were in public domain. With this challenge, I decided to try using the SEM to collect my personal imagery. I was trained by Dr. Josephine Taylor, professor of biology at Stephen F. Austin State University (SFASU), to

use the SEM and other preparatory equipment to create my own samples (Figure 1, 2).

To use the SEM, I needed samples of an object that I could examine. While conducting my initial research, I came across specimens of scanned nannofossils from phytoplankton, which proved interesting to me. I contacted Dr. Melinda Faulkner, assistant professor, of the Geology Department of SFASU, and I was able to obtain two samples from her of known rocks that contain phytoplankton. One rock was the Austin Rock, which is from a local source in Texas, USA, and the other is Calcite (Chalk) from the White Cliffs of Dover in Kent, England. In addition, I collected samples of diatomaceous earth, which also contain phytoplankton fossils. Using the samples, I was able to process specimens for the SEM in order as follows: Dilution, Filtration, Drying, and Sputtering/Coating.

Utilizing the “Filtration technique for SEM,” one of the four preparation techniques for quantitative nannofossil studies (Baumann et al. 76), I was able to cover dilution, filtration, and drying. I decided to use this “quantitative preparation method…in order to enable high precision coccoliths analysis” (Andruleit, 403), and it was the fastest of the four methods with preparation time “less than 45 minutes” (Baumann et al. 78). This technique also allowed for the use of commonly available laboratory apparatus and equipment. And finally, this

method allows for minimal alteration of the coccoliths or nannofossils during the dilution process (Baumann et al. 78).

The Dilution/ Filtration technique requires a small amount of sediment between 0.05 to 0.1 g. The sediment is weighed with an analytical precision balance and then suspended into 100ml of water. The suspension is then placed on a rotary stirrer to assist in further dilution and breakup of the sediments. The diluted suspension is then filtered using a 0.4μm pore size filter. The filter is then dried at 40˚C in an oven and placed on stubs for coating (Figure 3) (Baumann et al. 76).

Since the dilution/filtration technique has a quick preparation and process time, the method allowed for modifications to obtain a cleaner deposit of the nannofossils vs. other sediments on the filter paper. For this modification, I experimented with several filters of various pore sizes and varied the diluted suspension quantity through the filters. The best result was using between 0.4 – 0.45 μm pore size filter with one to two washes of the suspension through the syringe. These modifications allowed for more even distribution of the fossils across the filters and a larger discarding of unwanted sediments.

Once the stubs containing the samples were prepared, the next step was to complete the coating of the specimens using the *Denton Desk II Sputter Coater* (Figure 2). The sputter coater is used to cover specimens with a thin uniformed layer of gold palladium for SEM imaging (Figure 4). The metal coating

prevents the specimen from building up charge while under an electron beam within the high vacuum inside the SEM chamber. Once the specimens are covered through the sputtering coating process, then they are ready for placement in the SEM. The type of SEM I used to scan the samples was the *HITACHI S2300 SEM* (Figure 1). Only one sample at a time can be scanned in this type of SEM. The specimen is mounted on a holder and then placed in a chamber until a high vacuum is achieved. Once the voltage is activated, a tungsten filament produces an electron beam that moves down the column to the specimen in the chamber. The beam causes electrons to be emitted from the specimen, which are collected to provide images at very high resolutions (Figure 5 - 8).

I collected a large number of scanned images via the SEM of various types of nannofossils. During my research, I also came across an extensive database with a wider variety of nannofossil imagery. I contacted Dr. Jeremy Young, a research associate at the University College London, and one of the authors of the taxonomy database. I proposed an exchange of my imagery to add to their database to use their collection legally. My request was granted, and I was able to access a large range of imagery of different types of nannofossils to use as references.

Drawing, Illustrating and Laser Cutting

In my previous works with surface abstraction, I primarily focused on minimalism, patterns, and repetition. I wanted to continue exploring these themes and principles in my current work, because I found that they lend to factors which create more appealing, striking, and engaging compositions for my audience. When gathering the source imagery, I concentrated on the repetitious nature, distribution, and the structure of the exoskeletons. The groups of phytoplankton that captured these features were coccolithophores, diatoms, radiolaria, and several non-classified plankton groups. (Figure 22-33)

After obtaining samples and gathering images from the Nannotax database, I used the imagery as a reference for my initial sketches (Figure 9). Once a sketch was completed, it was then placed into the digital vector program, Adobe Illustrator, where it was made into vectors (Figure 10). During the vectorizing process, each piece would be layered into sections, just as they would when physically placed together, thus allowing me to visualize the work as a whole. After arranging the piece into its layers, I would then prepare each layer for laser cutting.

All laser cutting was completed on an Epilog Zing 60 Watts Laser Cutter. Most pieces consisted of 1/8 to a 1/4 inch Birchwood ply. Laser-cut acrylic frames were also used to encase a number of the pieces and allow viewers to observe the depth of the structures and layering of the pieces. Other works consist of laser cut 1/8 inch corkboard, an additional medium particularly useful because of its flexibility and laser cutting capabilities.

Inking and Layering

After completing the laser cutting process, the next step was to apply color. SEM imagery is not captured in the actual color of the specimen. If color is applied to an image, it is computer-generated. Since I wanted to treat these pieces more as abstractions, though using references to create them, I thought that applying my own color would contribute to their abstractive nature and, in essence, mimic the computer-generated colors.

Though simulating the computer's colorization process, the exhibit pieces were not colored randomly but arbitrarily. I employed several schemes and

techniques some of these include; analogous colors, monochromatic colors, color relativity, using similar color intensities, saturation, and values to create color opticals. Using the digital platform, Adobe Illustrator, I experimented and tested several color combinations for the vector illustrated format of a piece to find colors that worked best in the final arrangement (Figure 10). The digital arrangement and colorization of each layer allowed me to see beforehand how a piece would look with color applied. Once I had my final color combinations, I mixed acrylic inks to match the colors and apply them to the laser cut wood surfaces. After exploring printmaking and screen printing, I applied a few techniques learned using acrylic ink to my chosen media. Using a brayer, I would roll an even thin layer of ink and apply it to the laser cut wood. The process was repeated to give full coverage on the layer of wood, and to make it more vibrant in color. To achieve any color blending or gradient effects, I would mix two colors side by side on an acrylic sheet and then apply the colors or blends unto the laser cut surfaces with the brayer. Blending was completed first to get even mixes and to retain a thin layer of ink on the brayer.

After applying the ink, I continued to layer the pieces physically. I used a printout of the final digital arrangement to get an accurate alignment of the parts and then adhered them to the acrylic sheet. Once all the layers were glued and aligned on the sheets, they were mounted into their acrylic frames. Layering and fixing of the larger wall pieces followed a similar process. The pieces containing

laser-cut corkboard were all layered over a geometric template to assist in creating and maintaining its structure.

BACKGROUND

Artistic Influences

My approach departs considerably from traditional approaches such as drawing, painting, or sculpture. My art combines science and modern industrial technology with aspects of the traditional art form. It moves through experimentation and discovery into imaging with digital formats that are then carved by a machine and finally manipulated by the hand. Even though my approach incorporates many recently developed processes, I draw inspiration from several historical and contemporary artists when executing my work. Some of these artists include: Wassily Kandinsky, Josef Albers, Ellsworth Kelly, Larry Bell, James Turrell, and Yayoi Kusama. Their styles, concepts, theories, and processes in producing their art have steered my vision and significantly shape the content, structure, and artistic style of my work in *Surface Levels*.

Abstraction and Minimalism

Prior to beginning *Surface Levels*, I used data and information as the source material to execute my work. As a graphic designer with a science background, I felt the need to communicate with my audience, and I wanted some way to deliver factual information. In my earlier works, I experimented with random facts about manmade objects and completed a series that contained information about sports balls. One example is *336* (Figure 17), representing the number of dimples on a golf ball. Based on the number of impressions, I created wooden ellipses representing a percentage of the total amount of dimples on the ball. I reversed the image of the ball and kept very simplified and stylized impressions of the dimples. Continuing the series, I completed two more sculptures with a shuttlecock and a baseball. *108 and 108 Reverse* are visual representation of a baseball stitching (Figure 18).

The artwork in the ball series were very minimal and, in a sense, very abstract without any information. I eliminated part of the structure and left just enough hints of the realistic form so that a viewer could first look at it as an abstraction yet still subtly get clues about the object based on their titles. I wanted to continue with these two themes of minimalization and abstraction, to

simplify yet highlight particular structures within, or on the object's surface, which help distinguish it among others.

During my exploration, I eliminated the use of numbers and instead visualized minimalistic representations of natural surfaces not readily recognizable. I began to look at SEM imagery and used it to become the content of my work. The piece, *Ailerons* (Figure 19), represents several minute scales of a butterfly wing. In actuality, a wing contains hundreds of scales in one given section. But in this representation, the number was kept minimal, with only a few being magnified. This illusive feature disguised the qualities which a viewer may typically use to easily recognize the object. I layered the pieces and encased them with acrylic sheets to produce a sense of depth with space and utilized monochromatic colors for simplicity and minimalism. *Ailerons*' color allowed for emphasis on the structure and the layering of the forms so that the viewer would not deviate from the whole. Keeping with a similar format, I decided to employ the themes of minimalism and a level of abstraction within *Surface Levels*.

Continuing with SEM imagery, I began collecting images to create *Surface Levels* based on nannofossils. Throughout my body of work, I explored minimalism with the use of colors, shapes, and forms. Most pieces employed three colors or less. I chose to use limited number of colors for the focus to remain on the shapes and structures within the arrangements. One example from Surface Levels, *Mato* (Figure 40, 41), based on a non-

coccos, *Thaumatomastix* (Figure 22), is minimal in terms of its monotone color and use of simple geometric contours to create its form. *Corsellii* (Figure 45), based on the coccolithophore, *Calciosolenia corsellii* (Figure 24), contains several simplified forms and incorporating multiple lines creating an abstraction, having rhythm and movement. Each cell is individual but together as a whole, harmoniously forms its own patterned structure.

Works from painter Ellsworth Kelly and contemporary artist Larry Bell have influenced my use and incorporation of minimalism within my process. I admire Kelly's emphasis on shapes, geometric and organic, to create abstractions. Kelly employs three colors or less in most of his pieces, which further adds to the simplicity in his work. *Yellow over Dark Blue* and *The Mallarmé Suite* are recognizable pieces that use basic shapes and few colors. I utilized a similar approach from Kelly when selecting colors to use on the individual pieces in the exhibit, always keeping in mind that less is more, an idea shared by most minimalist. Also, drawing from my Graphic Design background, using a maximum of three colors allows for an effective and less overwhelming design. Larry Bell, another minimal artist, uses geometric form, shapes, and very subtle, and or a few colors in his work. His *Cubes* series, some of which can be viewed on larrybell.com, demonstrates his use of limited color on each coated glass cube. Another is a large-scale installation, *VFZ 3*, which mimics a California light fog with a pink-red inner rectangular core and an outer hazed cube (Figure 13).

Famously known as the pioneer of pure abstraction, painter and theorist Wassily Kandinsky developed his most recognizable paintings based on his theories of the visualization of sounds. His earlier works, which bridged his crossover from realism to abstractions, influenced my artistic approaches to *Surface Levels* with color. Impressionism played a pivotal role and veered Kandinsky's way of thinking in his process by moving away from traditional methods. He started simplifying shapes of forms and opted to use arbitrary colors as a way to deviate from realism and add some level of abstraction. He wanted to have an equal balance between representational shapes and color. Treating color more as an object and less as an application. This approach is evident in his paintings, such as *Murnau Kohlgruberstrasse* (Figure 11) and *Murnau-Landschaft mit grünem Haus*. Kandinsky's later works eventually become purely abstract as in his famous painting, *Composition VIII.* In these paintings, there are no recognizable forms and more obscurity with geometric shapes, lines, and colors. I see my pieces within the exhibit as abstractions, drawing parallels to Kandinsky's use of arbitrary colors and simplified shapes to form anonymity. The use of arbitrary color in *Surface Levels* serves to remove some of the realistic qualities from the organisms at a scientific level and begin abstracting it in an aesthetically pleasing way. It also creates a visual hierarchy, giving focus to the recurring elements created at infinitesimal degrees. I also drew from aspects of

his later works and experimented with various sizes of elements, shapes, forms, and lines within the structures.

Finally, most viewers have little knowledge of the vast variety of nannofossils that exist, making these visual representations less recognizable and hidden in plain sight. This ambiguous quality further lends to the exhibit's abstractive and elusive nature.

Color

As mentioned previously, SEM imagery is always in black and white or greyscale, and if colored, it is done artificially by software associated with the SEM or other editing programs and called a pseudo color. Since I had no references to the specimen's actual color, I viewed this opportunity as applying color to a blank canvas. I also saw this as a way to retreat from realism, similar to Kandinsky's *Murnau* paintings (Figures 11). Unlike the pseudo colors automated by a machine, my color choices were more systematic, and deliberately based on aesthetic factors, theories, and schemes that would aid in engaging the viewers'

capacities at a sensory level. Since the colors used were not actual representations of the organism, they are also considered arbitrary. I incorporated the use of different color intensities, values, and saturation in my body of work.

Josef Albers, an American-German artist, educator, and color theorist, is best known for his work with color theory and color interaction. While in the US, Albers traveled to Mexico occasionally and was inspired by the colors and shapes of buildings. He used these inspirations to fuel his concepts, utilizing simplified geometric shapes and colors, creating a series called *Variant/Adobe*. Holland Cotter noted, Albers had a big change with "emphasis on color over geometry as a source of dynamism, and with this shift the buildup to the '*Homage to the Square'* " series. I admire Albers' shift in using simplified geometric shapes to allow the color to take precedence over any other element.

Albers explored how people perceived color and the relationship between colors, or color relativity. His series the *Homage to the Square* shows the relationship of color as he laid squares within each other and altered their sizes, hues, and spatial distances to show how color can be affected or influenced by its surroundings (Figure 12). Albers' once stated, "A color has many faces," and this series demonstrates how a single color can appear different given the context (8). Albers color explorations piqued my interest in color experimentation. Simultaneous contrast or halation is a gradation effect created when two colors

or values surround a color. Halation gives an illusion that a single color has a gradient effect and is luminous where it meets the outer surrounding colors. Simultaneous contrast clearly shows the power of color. And, as Albers noted, “the fact that simultaneous contrast is a psycho-physiological phenomenon should prove that no normal eye, not even the most trained one, is foolproof against color deception” (23). Reverse ground is another of Albers’ techniques applied in my process. This technique takes three colors and make them look like four. Two ground colors are mixed to get a key color, which is placed in the center of the two ground colors as in the piece *Plate VI-3*. The background colors in Albers’ piece optically modifies the key or foreground color. This effect occurs when the background subtracts color from the key, thus altering the appearance, giving the impression of a change in each key though both are the same.

Long Frust (Figure 32, 33) represents the diatom *Lyrella*, and uses the colors of blue and pink of similar intensities and saturation on the exteriors of the fossils. The visual weight of the blue diatom equally balances that of the pink by color and size. The arrangement is asymmetrically balanced, with the pink diatom occupying a larger positive space compared to the blue.

Circular Frust (Figure 34, 35), is a representation of a diatom *Arachnoidiscus*, which employs an analogous color scheme of orange-red, red and purple. These diatoms are very symmetrical, but the arrangement assists in breaking up the formality. The structure still retains its radial nature and contains many leading

lines that carry you throughout the piece and emphasize the center points of each diatom.

The *Pina* (Figure 36, 37), based on non-coccos *Pinaciophora* (Figure 20), applies the warm colors of red, yellow, and orange. The fossils are arranged in a cluster to the top right and is balanced with a single fossil at the bottom left. The arrangement also creates visual tension between the two sides, as though the group may eventually collapse to join the isolated fossil.

Mato (Figure 40, 41) has a monochromatic color scheme, using purples of different saturation and value. The arrangement of these naturally triangular fossils shows movement and rhythm with the altering of the positions between each element.

Nulus (Figure 38, 39), based on the radiolarian *Saturnalis circularis* (Figure 21), utilizes an analogous color scheme of green and yellow. The dark green inner core of this radiolarian is emphasized by the contrasting yellow of the outer core. The arrangement in this relief shows movement and uses the outer rings' lines to create effective continuation.

Fragments #1 (Figure 42) and *Fragments #2* (Figure 43) are both broken pieces of unknown phytoplankton structures. In *Fragments #1*, one-piece applies the complementary colors of purple and yellow while the other uses analogous colors. Arranging the yellow layer as the top and the darker colors of purple and orange below, emphasizes the structure of the pattern and creates depth. In

Fragments #2 the concept of the reverse grounds is at play. Both the light blue-green and yellow colors are reversed on opposite ends. The yellow on the top section looks much brighter in contrast to the yellow at the bottom. The opposite can be said for the light blue-green color in the top and bottom sections. Like in Albers's theory, the colors are the same but appear to look different because of surrounding color. The piece is asymmetrically balanced and is harmonized by the saturation of both colors.

Nocha (Figure 44), based on non-coccos *Stephanocha speculum* (Figure 23), utilizes warm colors of yellow-orange, orange, and red. This single structure also incorporates the concept of simultaneous contrast with slight halation occurring near the edges where the color interacts.

Corsellii (Figure 45), a multi-structured larger relief, employs the concept of simultaneous contrast with different cobalt blue values. Halation can be seen occurring through the layers with the change of value from lightest at the top, to darkest blue towards the base.

Laris (Figure 46), represents a combination of radiolarians (Figure 25) and uses the concept of the reverse grounds. The ashy-green color on the bottom layers of both pieces was made from a mix of purple and bright green seen on the top layers. When against the purple, the ashy green color looks brighter than when it is against the bright green. The purple is subtracting the dark tones from the ashy green while the bright green is doing the opposite, hence making it

appear darker. *Laris*'s bloom or cluster is asymmetrically balanced and creates rhythm with the positioning of the fossils against each other.

Peta (Figure 47), representing the non-coccos Petasaria protruberans (Figure 26), applies analogous colors of yellow, bright green, and dark green. The piece displays movement with the placement of the fossils and rhythm with the blends of the analogous colors applied on the exoskeletons.

Albers techniques gave me a new sense of respect for color and its expressive possibilities. Achieving Albers' opticals and finding the right colors to apply to the nannofossils were by no means easy tasks, but they were effectively incorporated and is evident throughout the body of work. Overall, my color choices were used to show emphasis on particular structures, to balance, create rhythm, show movement, and to display unity and harmony in the body of work.

Repetition

Another theme I explored throughout *Surface Levels* was repetition. Primarily, repetition by numbers and secondarily repetition by colors was used within the exhibit.

Japanese contemporary artist Yayoi Kusama influenced my use of repetition in my process. She is well known for her whimsical sculptures and installations that incorporate bold colors and repeating motifs, notably the dot. In an interview with BBC.com, Kusama states, “these are my own work about my life. The deep emotion of being born human and the various movements of a space as we know them. We can find out all sorts of things about these through dots.” Her reasoning behind the extensive use of dots are representations of her life, emotions, and thoughts. She also explores infinity within her work, using mirrors within some of her installations to give the viewer a never-ending reflection of the sculptures. Kusama infinity series installation, *All the Eternal Love I Have for the Pumpkins* (Figure 16), shows her play with infinity and endless repetition.

Kusama's process of using motifs and adding multiplicity to create patterns with rhythm and variety is fascinating. Her use of multiples inspired me

to highlight this aspect within the nannofossils' structures and formations. Under the SEM, nannofossils are often observed distributed in clusters called blooms or in multiples (Figure 5). I was influenced to apply this aspect of ecological distribution and highlight the repetition within the nannofossil blooms, creating multiples within an array of my pieces. I captured and echoed another of the nannofossil's recurring nature by focusing on the lines and shapes within the exoskeletons. I also demonstrated the clusters by repeating the color motif on their exteriors and emphasizing other recurring features by the organism.

The coccolithophores in the series, *Liths*, in *Surface Levels*, consisted of strictly white forms and shows the distribution of these in a formation called a coccosphere. Coccospheres consist of mature coccoliths (calcite platelets) that are extruded and organized into an extracellular layer covering the cell surface (Walker, et al.) In the *Liths* series, I intentionally didn't want to apply color to these structures. Instead, I wanted to highlight the coccolithophores' repetitious structure and make it the central element emphasized.

Circcoccos (Figure 48) consists of the coccolithophores *Pontosphaera discopora* (Figure 27), *Emiliania huxleyi Type O* (Figure 31), and *Alisphaera gaudii* (Figure 30). The coccolithophores in *Circcoccos* all form circular coccospheres. Each contains a uniquely shaped coccolith that is recurring in the body of the coccolithophore.

The Sphere (Figure 49) represents coccolithophores Emiliania huxleyi Type A (Figure 28) on the outermost shell, and *Emiliania huxleyi Type O* (Figure 29) on the most inner shell. Frequently under the SEM mixtures of nannofossils can be observed and fragments of various types stacked on each other. I decided to simulate that with *The Sphere* structure. *The Sphere* is hung from the ceiling for a 360-degree view.

Towerco (Figure 50) consists of coccolithophores *Helicosphaera carteri* (Figure 31) and *Toweius serotinus*. The coccosphere of *Helicosphaera carteri* is elongated compared to other coccospheres, such as *Emiliania huxleyi Type O* (Figure 29). I wanted to use the elongated feature as the basis for the *Towerco* sculpture. *Toweius* though part of this sculpture, doesn't produce an elongated coccosphere but was still incorporated to show its coccoliths repetitious elements.

The acrylic wall series, *Noncoc*, displays repetition with colors and structures, most containing nannofossils of two or more of the same type. Some of these also carry recurring shapes within their structures; for instance, *Pina* (Figure 36, 37) contains many circular holes towards its center while the outer ring contains smaller holes. Another example is *Circular Frust* (Figure 36, 37), containing a variety of repetitious lines, one set which radiates from a center point and inner circular lines that decrease towards the center.

Corsellii (Figure 45), part of the larger wall series *Blooms*, contains many repetitious lines. The center structure contains vertical lines, while the body has many diagonal line placements. Additionally, the arrangement itself shows multiplicity by numbers. *Peta* (Figure 47), also part of the *Blooms* series, utilizes repetition by color and structure with the multiple elliptical holes.

Depth, Space and Dimensions

In my exploration and experimenting with my chosen medium, I devised a way to convey spatial depth and create dimension with the structure of my pieces. It was a challenge since the laser cut pieces were flat, and I had to figure out a way to put them together to give the appearance of forms and dimensionality. To achieve the depth and space, I utilized layering. Corkboard and wood were used in the assembling of the actual structures, but in my process, I found that applying layers of acrylic sheets between the forms increased the spatial depth within a number of my pieces. I chose to use acrylic because of its transparent and translucent qualities, even taking advantage of

anti-glare haze to further enhance the impression of spatial depth. The medium also gives the perception that the forms of the phytoplankton are suspended and are still afloat in their natural habitat.

Artist, Larry Bell extensively used glass and acrylic in his artwork. He also finds layering and dimensionality to be a part of his process of creating depth and space. These factors are exemplified in his installations, *VFZ 3* (Figure 13), and *Standing Still* (Figure 14). Another artist who creates dimensionality within their work is James Turrell. Turrell uses color from lights to create a perception of depth. Turrell stated in an interview, “I use light to explore the meaning of perception. I make spaces that project light, apprehend it. But I don’t make the light” (Carroll). Turrell also constructs these deceivable forms with light that look three dimensional, as in *Reathro II, Magenta* (Figure 15), but in reality, they are flat. Whether or not these are two-dimensional or three-dimensional depends on the perception of the viewer. Turrell’s choice to leave this open-ended is a parallel concept I use for my audience. Bell and Turrell have both inspired me and my process with their works and how they use depth and space to create dimensionality.

CONCLUSION

Surface Levels is a collection of work that goes to great depths, peeling away layers, excavating and exposing elements once concealed. Scientifically based but visually and artistically translated, it references from the real to create abstractions because of its unfamiliarity. The work encourages the audience to observe structures and complexities derived from the most minuscule form of life, a hidden natural phenomenon. The themes of minimalism and abstraction are explored through the arrangement of its structure, shapes, and color. The artwork forms a sense of continuity, pushing outwards to show depth and volume within the given space. Its repetitious motifs, sometimes chaotic and otherwise balanced, are echoed throughout each series in *Surface Levels*.

To get a more comprehensive and detailed look of the collections within *Surface Levels*, please visit the exhibition website, www.surfacelevels.online.

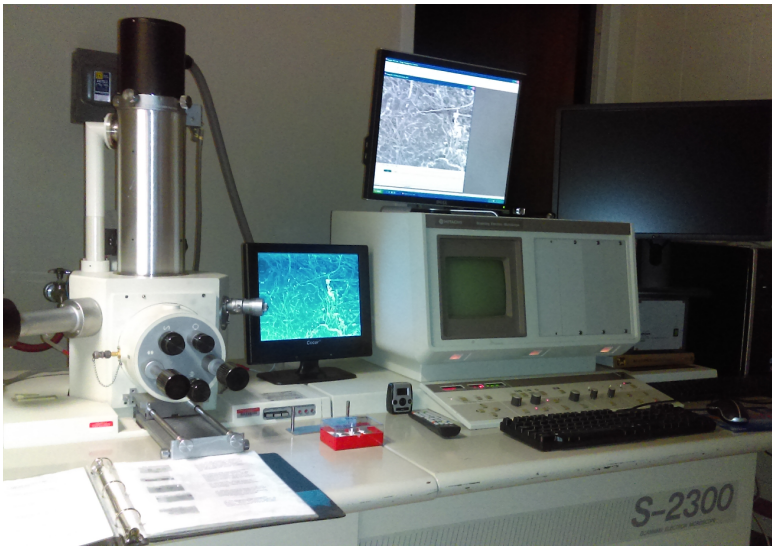

Figure 1, *Hitachi S-2300 Scanning Electron Microscope* (SEM)

Figure 2, Preparatory Equipment, *Denton Desk II Sputter Coater*

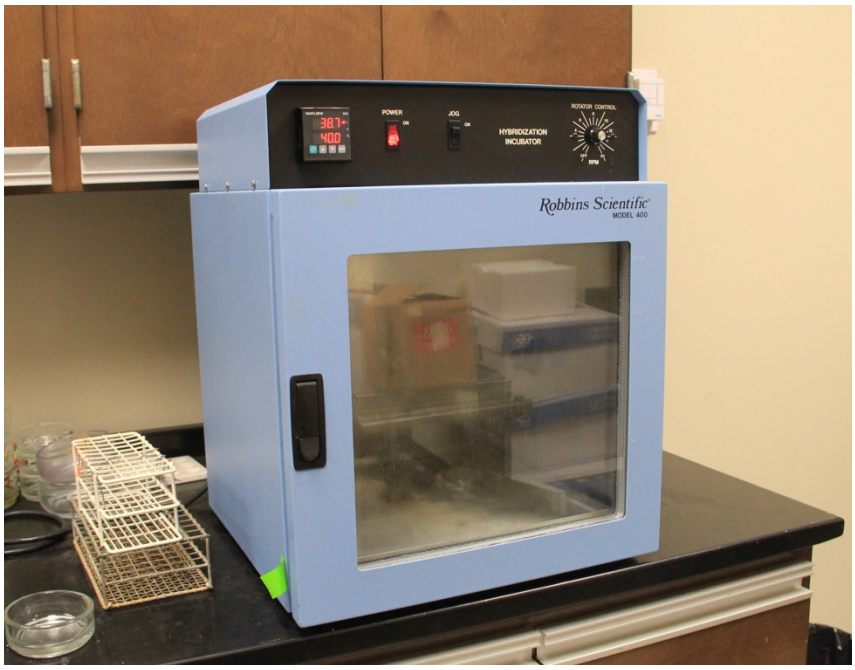

Figure 3, *Drying Process* for filters

Figure 4, *Coating Process,* with layer of plasma on stubs containing specimen

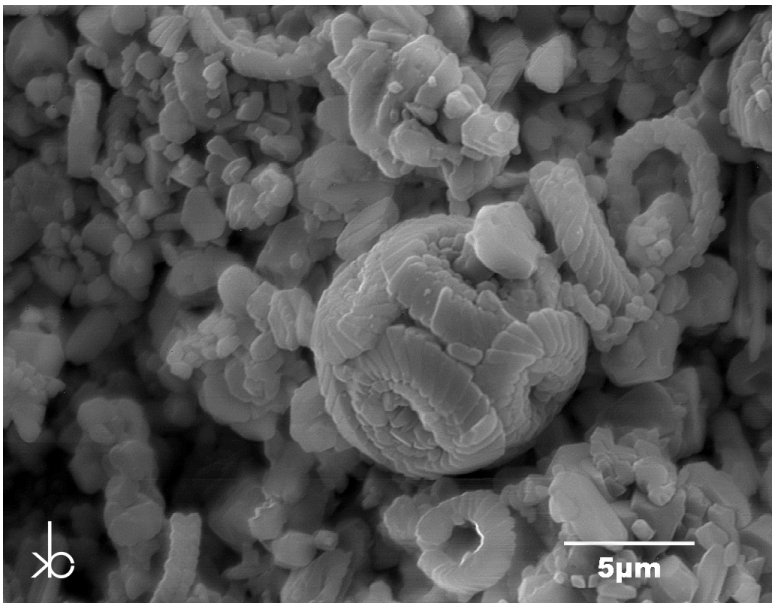

Figure 5, *Coccosphere* among coccoliths

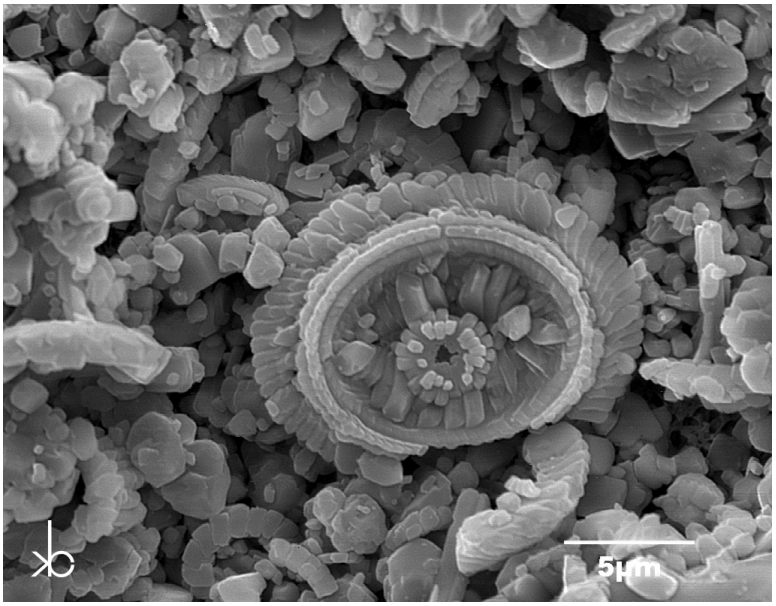

Figure 6, *Coccolith*

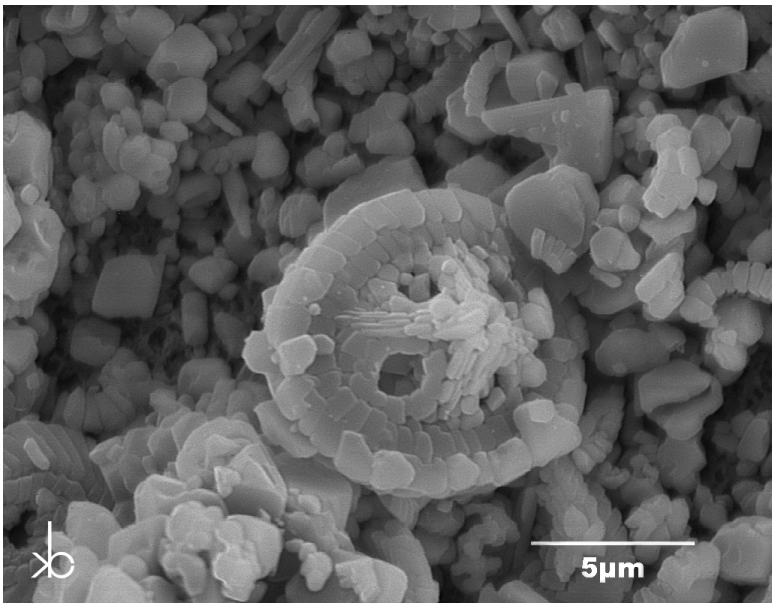

Figure 7, *Coccolith*

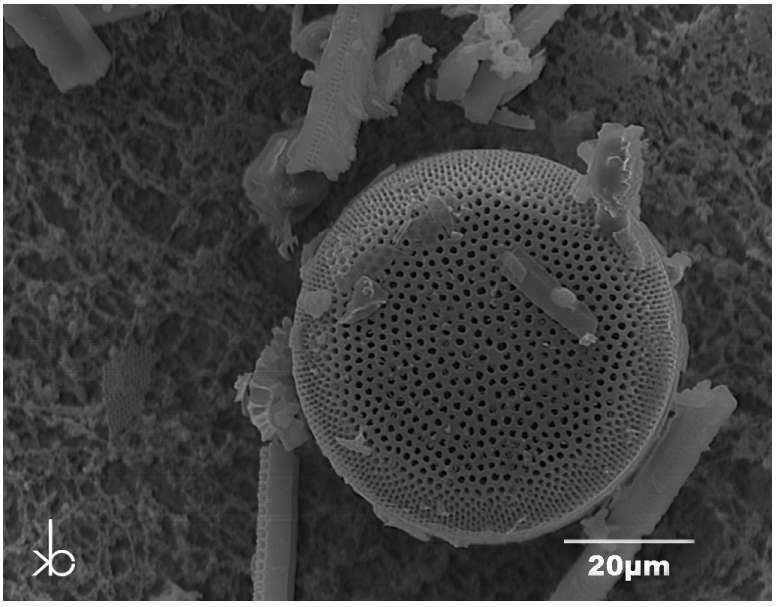

Figure 8, *Diatom*

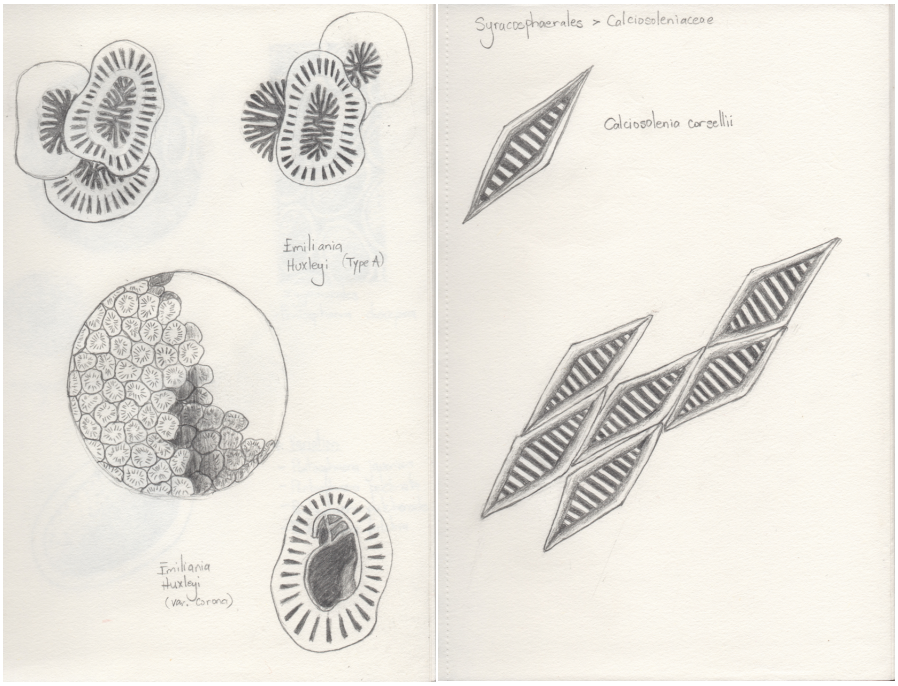

Figure 9, *Sketches*

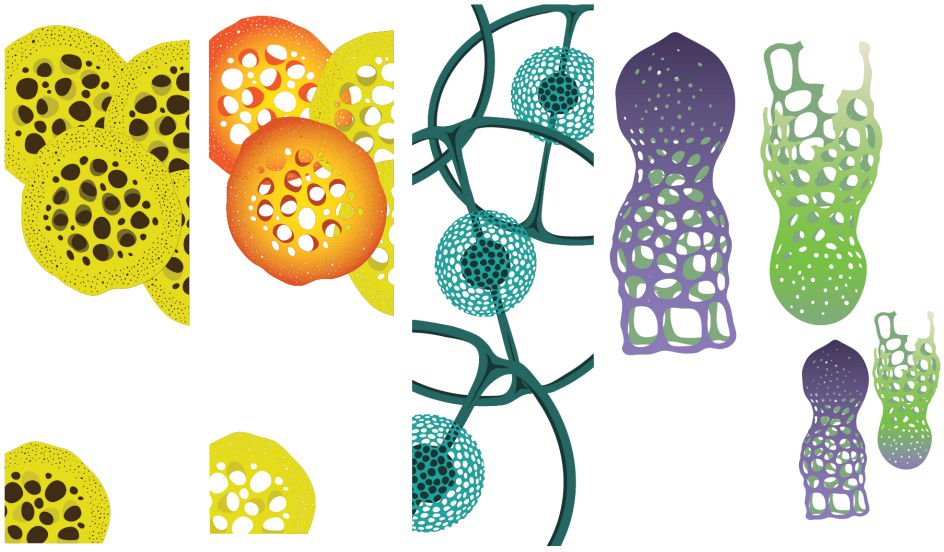

Figure 10, *Vectorize pieces* in different colors

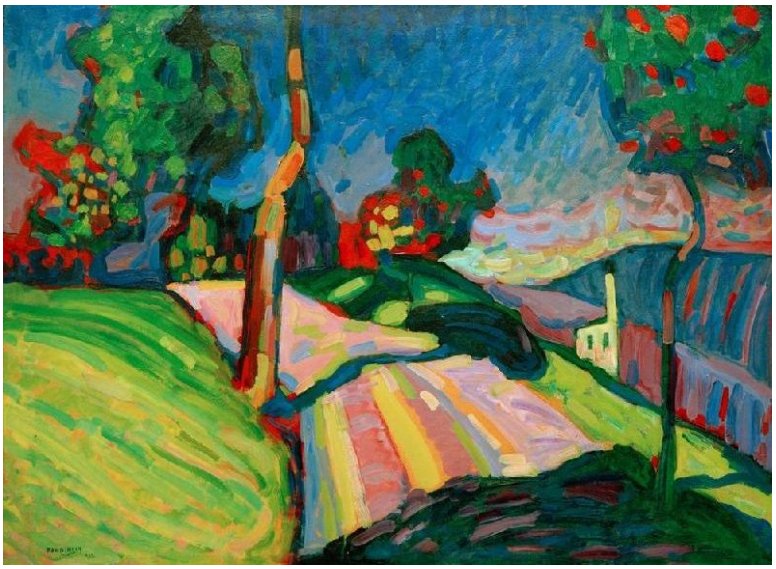

Figure 11, Wassily Kandinsky, *Muranu, Kohlgruberstrasse,* 1909, Oil on Cardboard, 28.3 x 38.6”

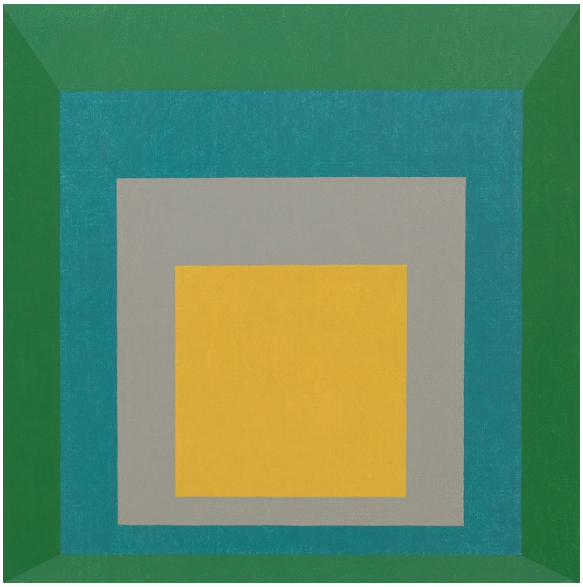

Figure 12, Josef Albers, *Homage to the Square: Apparition,* 1959, Oil on Masonite, 47.5 x 47.5”

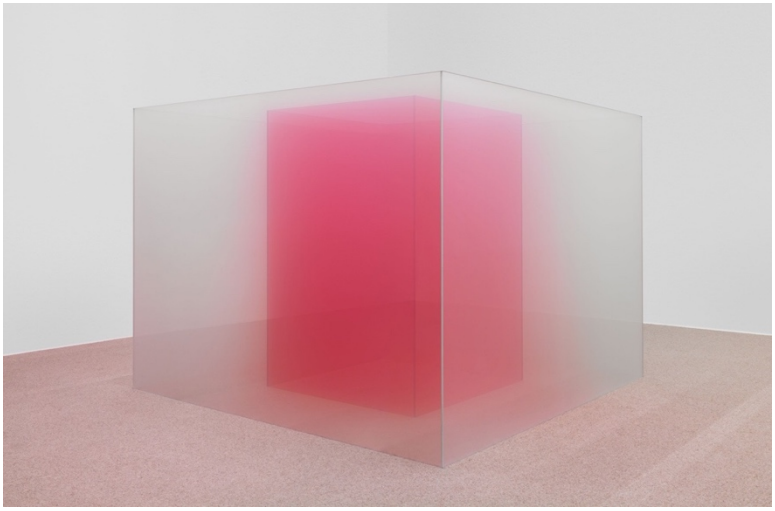

Figure 13, Larry Bell; “VFZ 3”; *Hauser & Wirth,* 2017, https://dailyartfair.com/exhibition/7763/larry-bell-hauser-wirth; Laminated Glass, 72 x 96 x 0.5”.

Figure 14, Larry Bell; “Standing Still”; *Hauser & Wirth,* 2020*,* https://brooklynrail.org/2020/03/artseen/Larry-Bell-Still-Standing; Coated Glass.

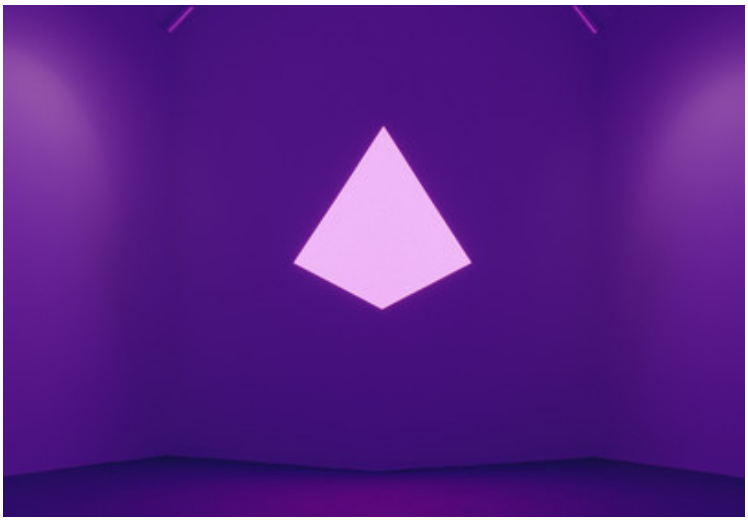

Figure 15, James Turrell; “Reathro II, Magenta”; *MassMoCa*, 1970*,* https://www.artsy.net/artwork/james-turrell-raethro-ii-magenta-corner-shallow-space; Projected Light.

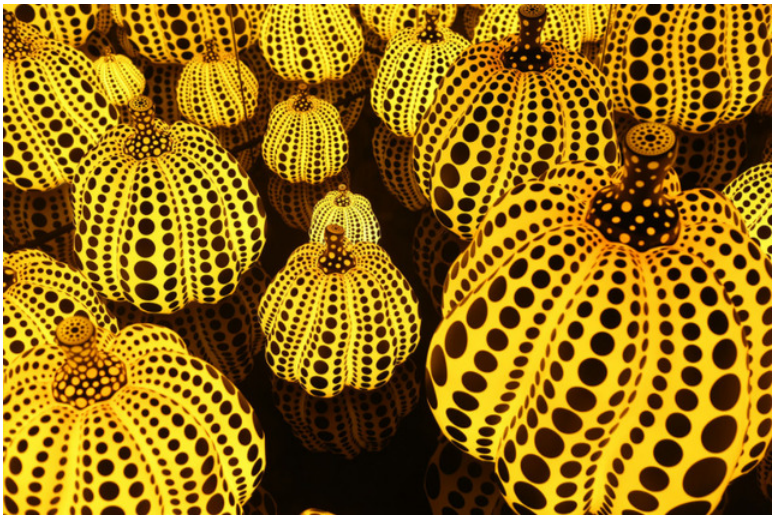

Figure 16, Yayoi Kusama; “All the Eternal Love I Have for the Pumpkins”; *Dallas Museum of Art,* 2016, https://www.artsy.net/show/dallas-museum-of-art-yayoi-kusama-all-the-eternal-love-i-have-for-the-pumpkins

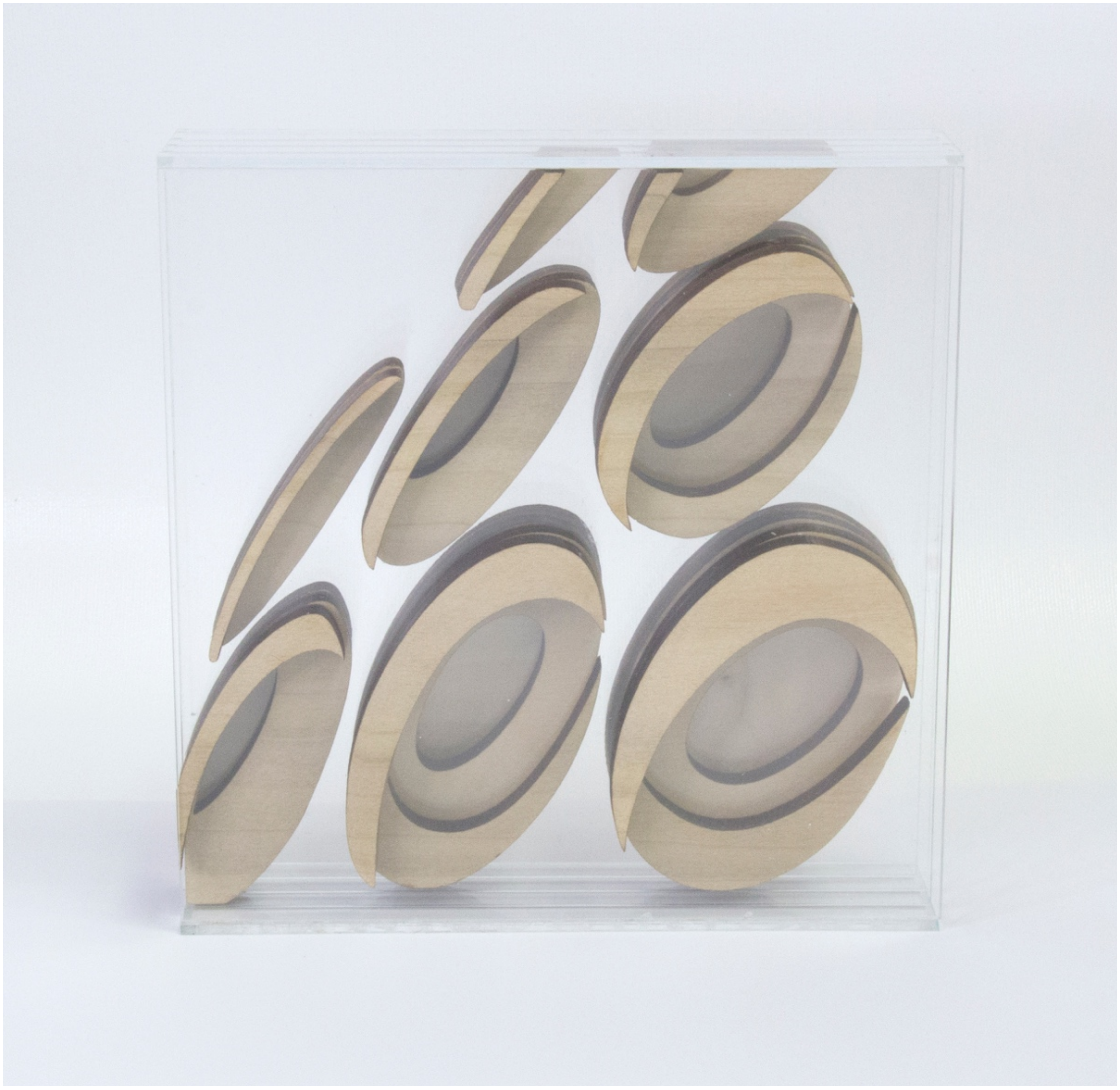

Figure 17, *336*, 2018, Acrylic and Wood, 5 x 5”

Figure 18, *108 and 108 Reverse*, 2018, Mixed Media, 5.5 x 5.5”

Figure 19, *Ailerons*, 2018, Acrylic and Wood, 18 x 16”

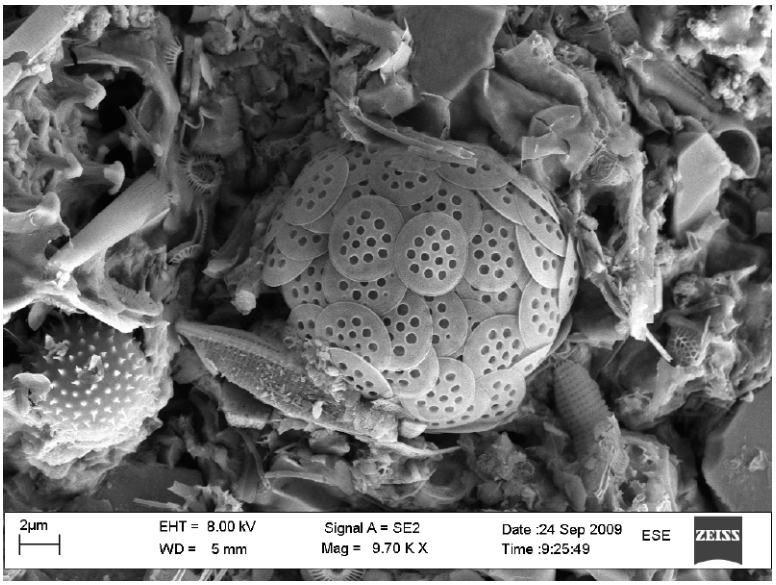

Figure 20, Young et al.; “Pinaciophora”; *Nannotax3 website*, 2020, http://mikrotax.org/Nannotax3/index.php?id=20300

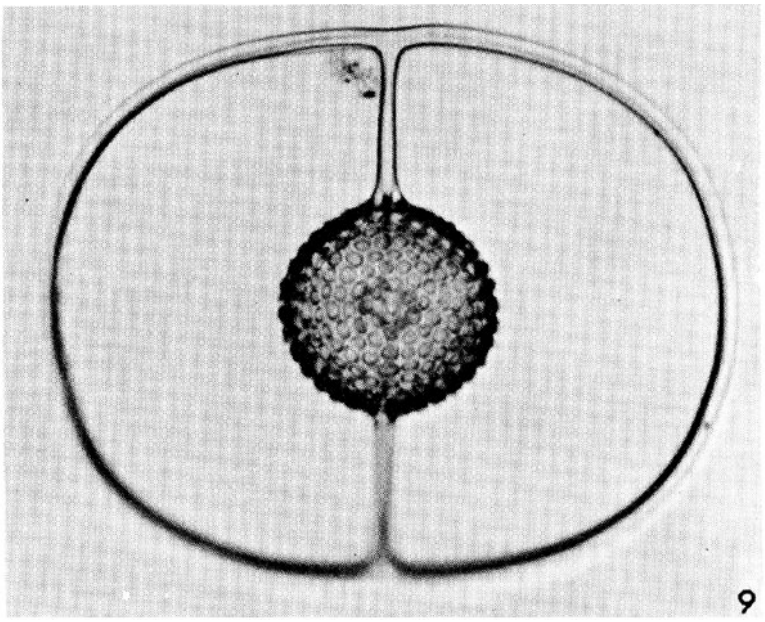

Figure 21, Young et al.; “Saturnalis circularis”; *Nannotax3 website*, 2020, http://www.mikrotax.org/radiolaria/index.php?id=205324

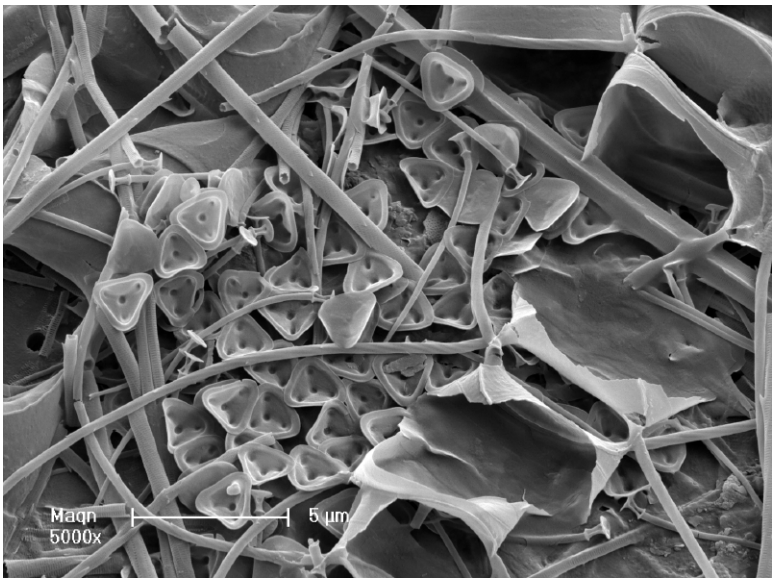

Figure 22, Young et al.; “Thaumatomastix”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=20477

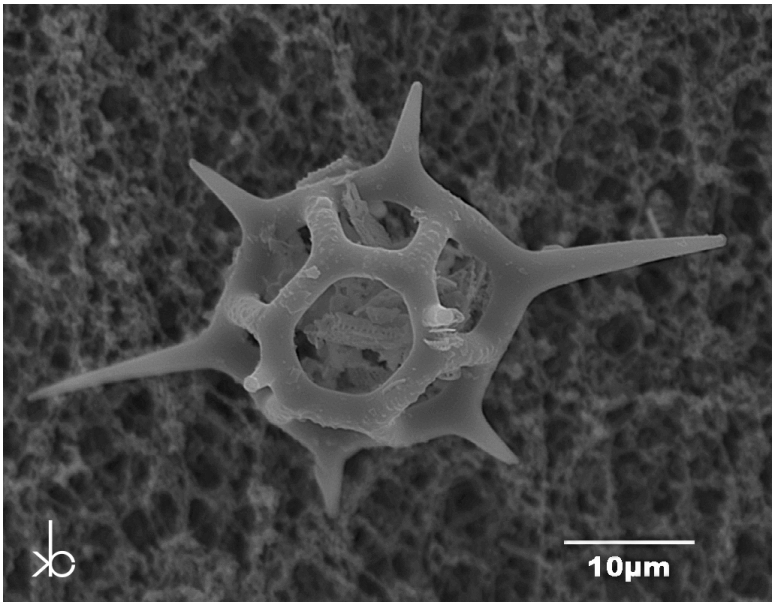

Figure 23, *Stephanocha speculum*

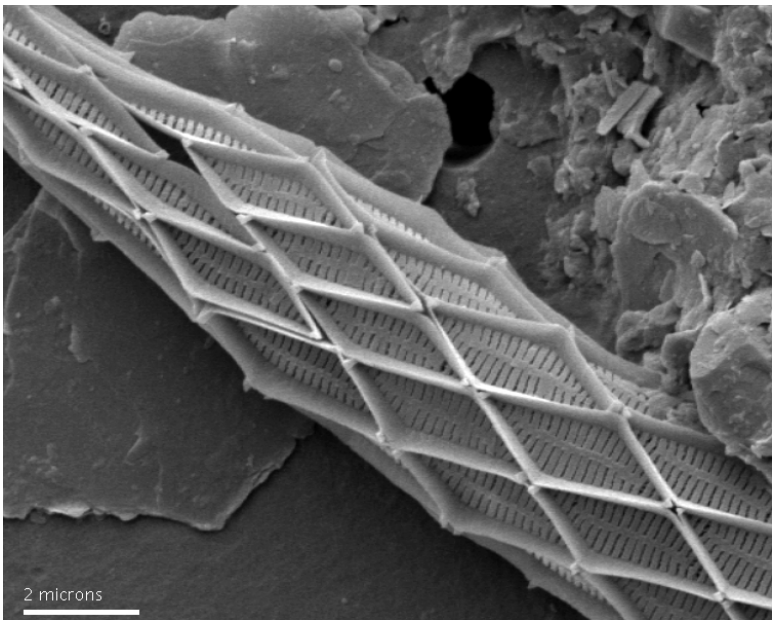

Figure 24, Young et al.; “Calciosolenia corsellii”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=204

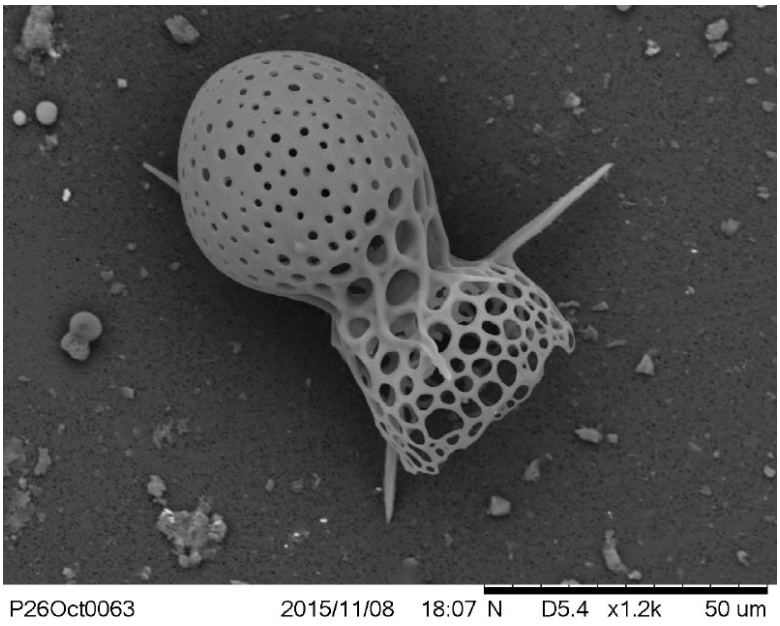

Figure 25, Young et al.; “Radiolarian”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=20413

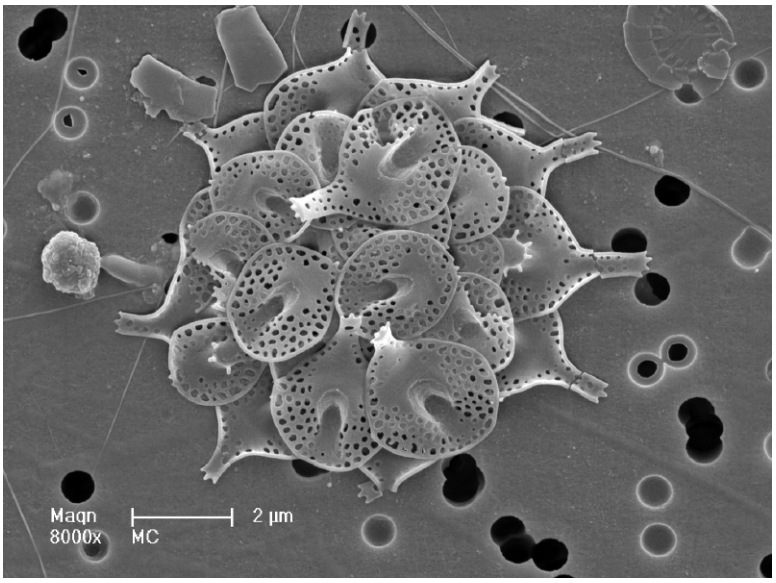

Figure 26, Young et al.; “Petasaria protruberans”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=20286

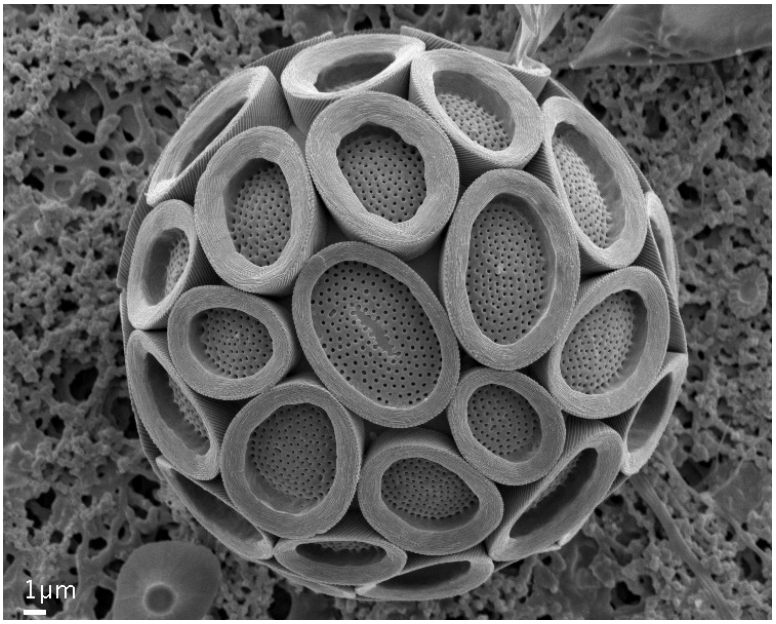

Figure 27, Young et al.; “Pontosphaera discopora”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=1068

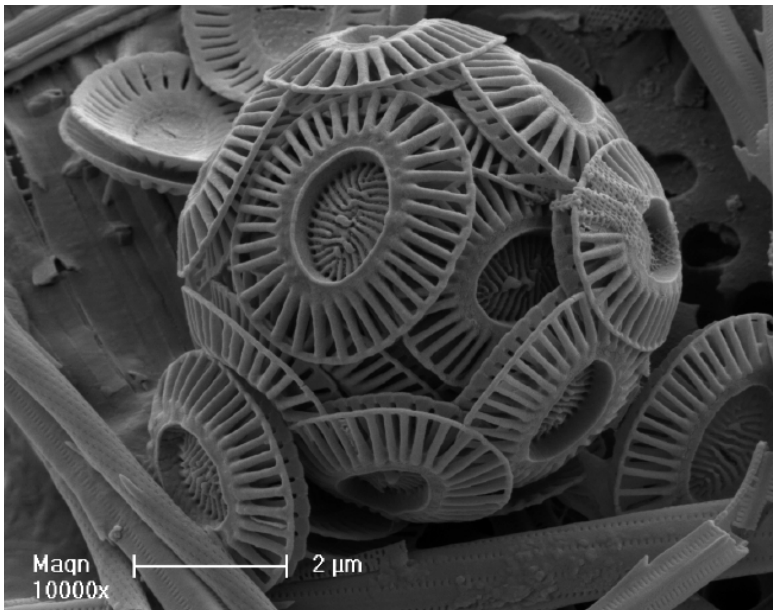

Figure 28, Young et al.; “Emiliania huxleyi Type A”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=536

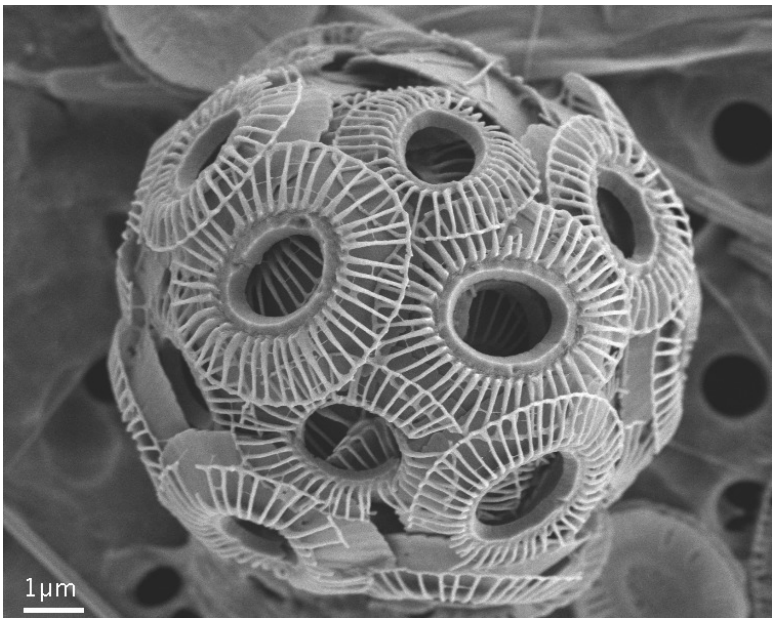

Figure 29, Young et al.; “Emiliania huxleyi Type O”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=541

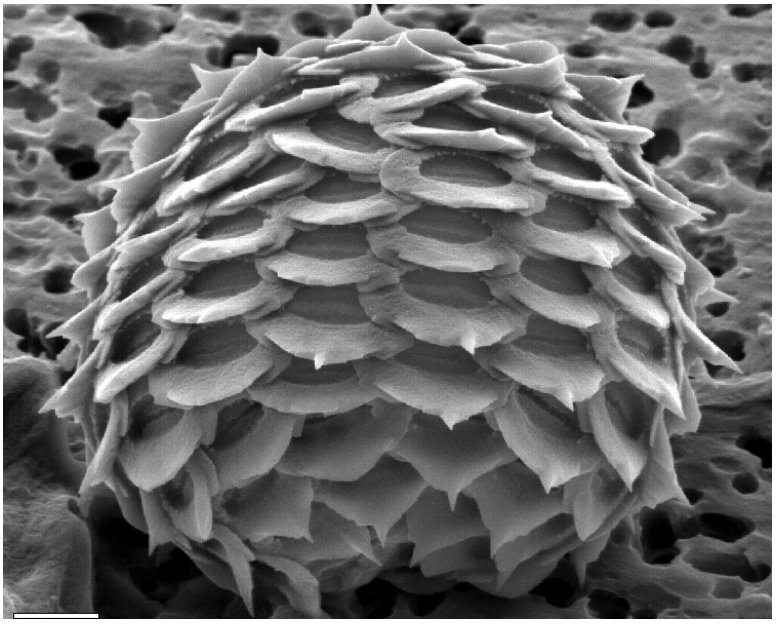

Figure 30, Young et al.; “Alisphaera gaudii”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=29

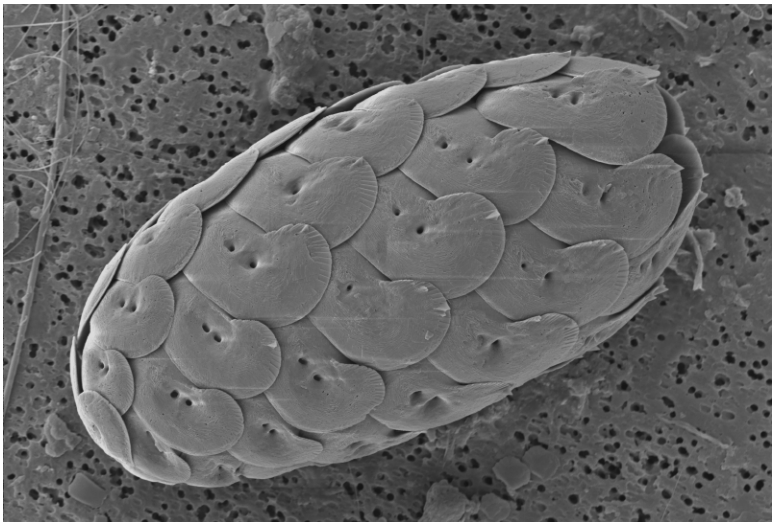

Figure 31, Young et al.; “Helicosphaera carteri”; *Nannotax3 website*, 2020, http://www.mikrotax.org/Nannotax3/index.php?id=655

Figure 32, *Long Frust (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

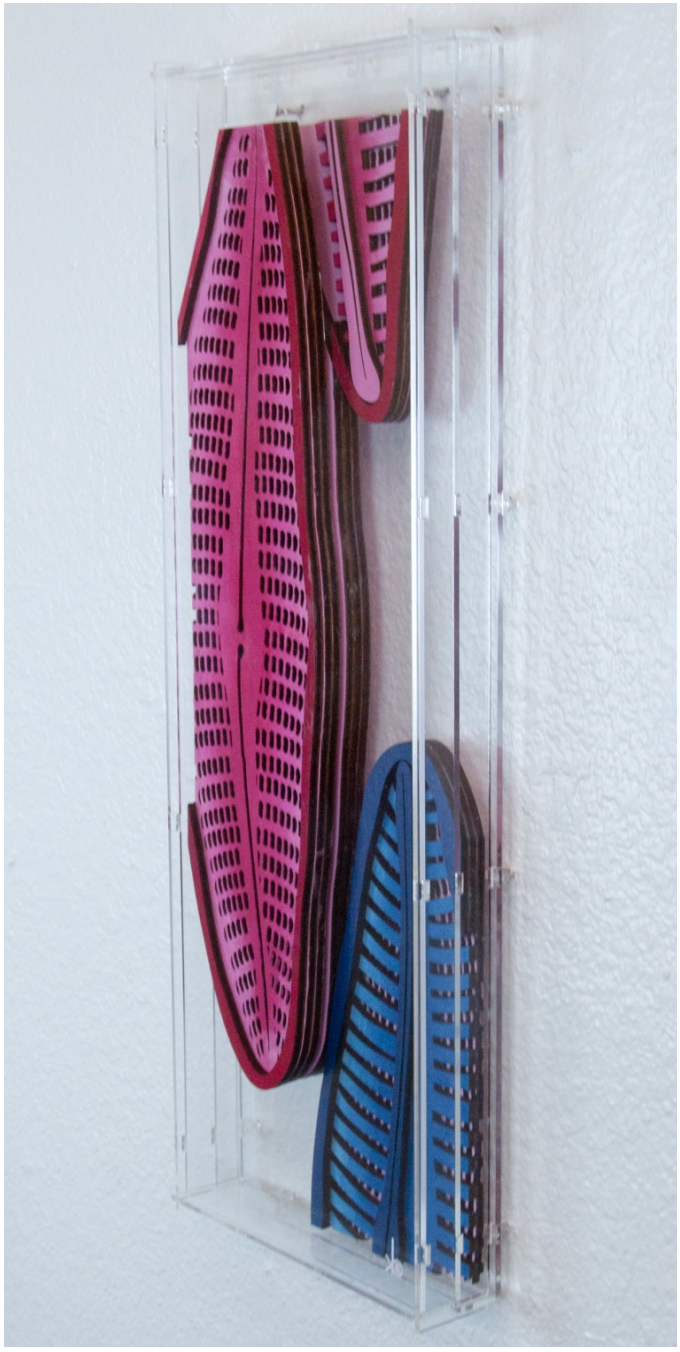

Figure 33, *Long Frust Side (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 34, *Circular Frust (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 35, *Circular Frust Side(Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 36, *Pina (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 37, *Pina Side (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 38, *Nulus (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 39, *Nulus Side (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 40, *Mato (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 41, *Mato Side (Noncoc Series)*, 2020, Mixed Media, 18 x 5”

Figure 42, *Fragments #1 (Noncoc Series)*, Mixed Media, 2 x 30” (each)

Figure 43, *Fragments #2 (Noncoc Series),* Mixed Media, 2 x 30”

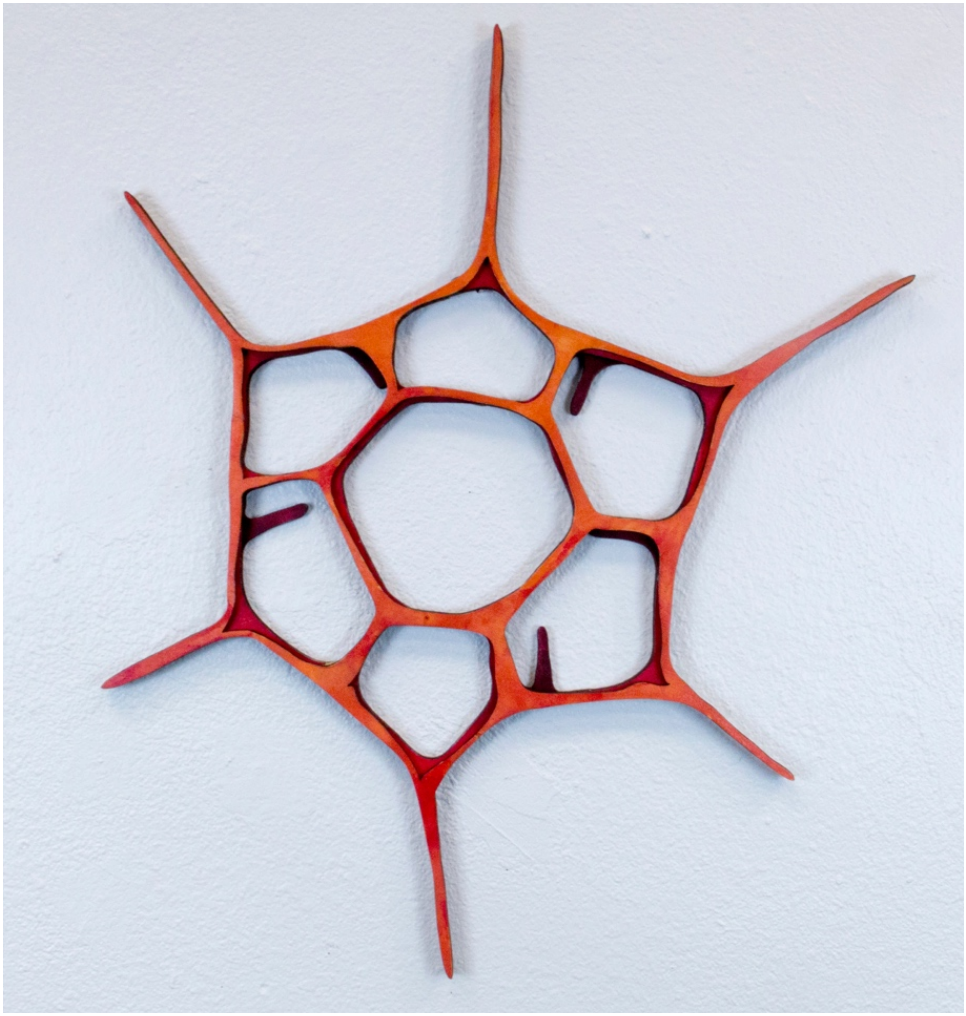

Figure 44, *Nocha (Blooms Series)*, 2020, Wood and Acrylic ink, 21 x 25”

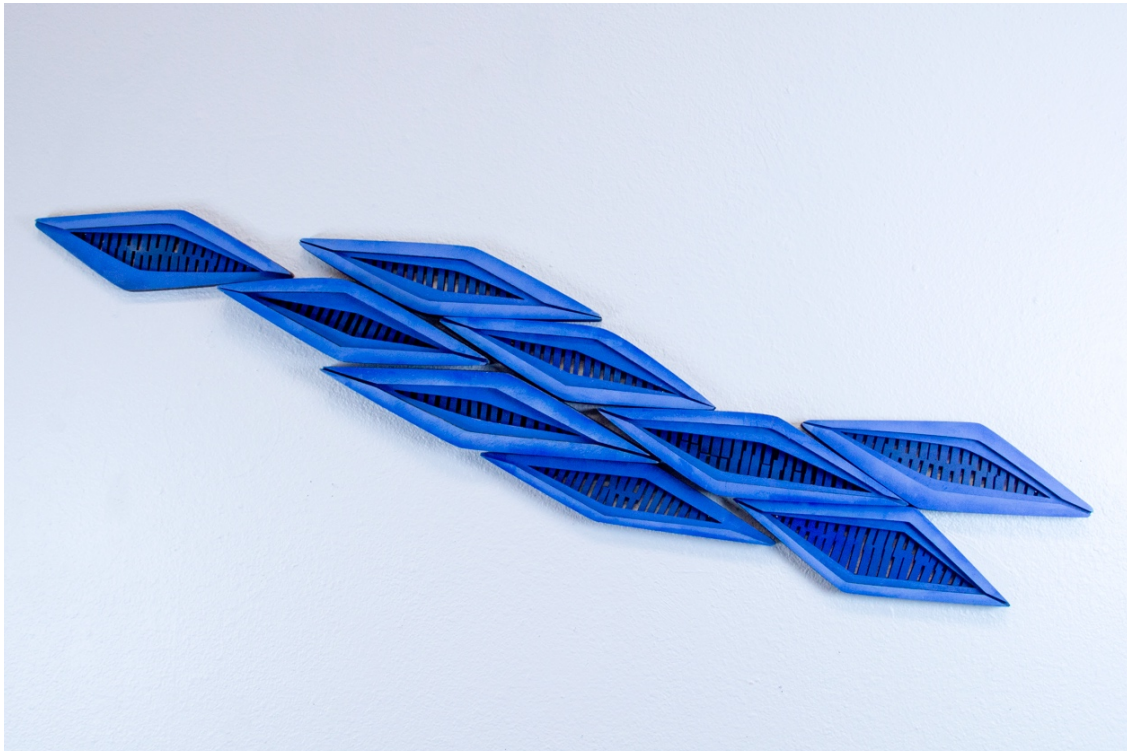

Figure 45, *Corsellii (Blooms Series)*, 2020, Wood and Acrylic ink, 41.25 x 15.5”

Figure 46, *Laris (Blooms Series),* 2020, 2 x 30” Wood and Acrylic ink, 14 x 24”

Figure 47, *Peta (Blooms Series),* 2020, Wood and Acrylic ink, 21.5 x 13.5”

Figure 48, *Circcoccos (Liths Series),* 2020, Mixed Media

Figure 49, *The Sphere (Liths Series),* 2020, Corkboard and Acrylic Ink

Figure 50, *Towerco (Liths Series),* 2020, Corkboard and Acrylic Ink

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VITA

After graduating from St. Joseph's Convent, St. George High School, in 2001, Keisha Brathwaite attended the T.A. Marryshow Community College in Grenada W.I. where she graduated with an Associate Degree in General Studies in 2003. Brathwaite then attended Cameron University in Lawton, Oklahoma where she earned a Bachelor of Science Degree in Multimedia Design in May 2009. Brathwaite then furthered her studies at the New Mexico Highlands University, earning a Master of Arts Degree in Media Arts and Computer Science and a Master of Software Driven System Design in May 2012 and December 2017, respectively. In 2018, Brathwaite entered Stephen F. Austin State University and attained the degree of Master of Fine Arts in August 2020.

Permanent Address: Lower Woburn, St. George's
Grenada W.I.

MLA Format

This thesis was typed by Keisha C. Brathwaite